

Nov. 10, 1942.

D. R. STAPLETON

2,301,646

HUMIDIFIER

Filed Dec. 28, 1940

FIG. 1

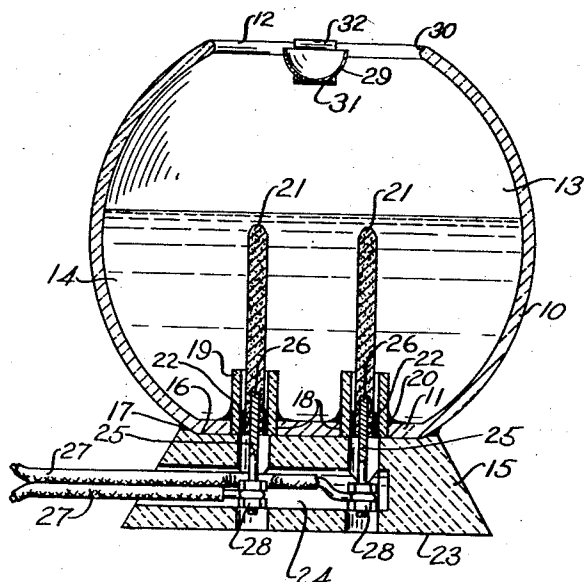


FIG. 3

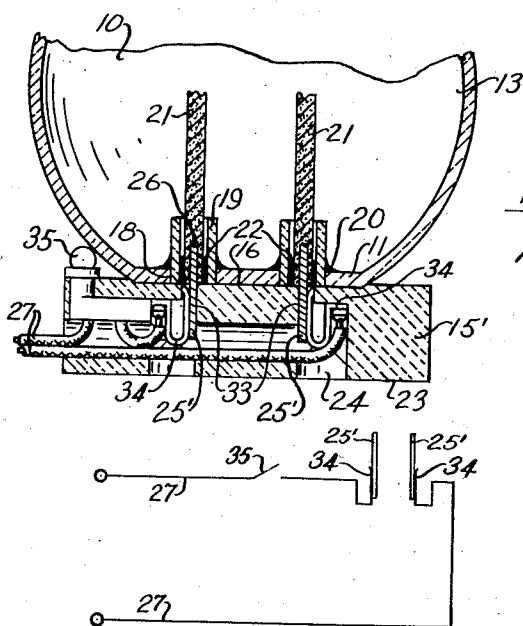
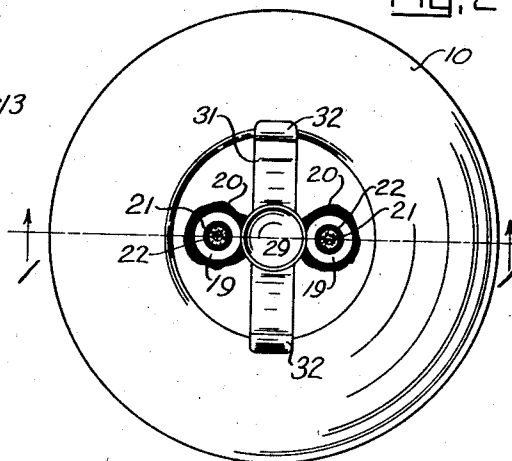


FIG. 4

FIG. 2



INVENTOR
DONALD R. STAPLETON
BY
G. H. Braddock
ATTORNEY

UNITED STATES PATENT OFFICE

2,301,646

HUMIDIFIER

Donald R. Stapleton, Minneapolis, Minn., assignor
of one-half to Frederick H. Sandberg, Jr.,
Minneapolis, Minn.

Application December 28, 1940, Serial No. 372,212

14 Claims. (Cl. 219—40)

This invention has relation to a humidifier, or a device for supplying moisture to atmosphere. An object of the invention is to provide a humidifier which will be of novel and improved construction.

A further object is to provide a device of the present character wherein will be incorporated various improved features and characteristics of construction novel both as individual entities of the device and in combination with each other.

A further object is to provide a novel and improved humidifying device which will be of simple and inexpensive construction and will function satisfactorily and efficiently in use over an indefinitely long period of time.

And a further object is to provide a device for supplying moisture to atmosphere which will incorporate constructional features and characteristics designed to render the device an improvement generally over devices heretofore known intended for humidifying purposes.

With the above objects in view, as well as others which will appear as the specification proceeds, the invention comprises the construction, arrangement and combination of parts as now to be fully described and as hereinafter to be specifically claimed, it being understood that the disclosure herein is merely illustrative and intended in no way in a limiting sense, changes in details of construction and arrangement of parts being permissible so long as within the spirit of the invention and the scope of the claims which follow.

In the accompanying drawing forming a part of this specification,

Fig. 1 is a vertical sectional view, taken on line 1—1 in Fig. 2, of a humidifier made according to the invention;

Fig. 2 is a top plan view of the humidifier disclosed in Fig. 1;

Fig. 3 is a fragmentary vertical central sectional view of a humidifier of modified construction including principles of the invention, and

Fig. 4 is a diagrammatic view of the electrical system of Fig. 3.

With respect to Figs. 1 and 2 of the drawing and the numerals of reference thereon, a container of the humidifier is denoted 10. As disclosed, said container is composed of glass. It could, however, consist of other insulating material suitable to the purposes of use for the container.

In the illustrated embodiment of the invention, the container 10 is of bowl or generally spherical shape. The bottom or base 11 of said

container is flat, and the upper portion or top of the container includes an outlet or opening 12 desirably of reduced area for passage of vapor from an interior space or chamber 13 provided by said container and bounded by its curvilinear side and flat bottom walls. Save at the outlet opening 12 the interior space or chamber 13 is closed. Said interior space or chamber 13 is adapted to contain water, or other liquid, 14 to be evaporated. Usually, the liquid placed in the interior space or chamber 13, through the mouth or opening 12, will be water to which some common salt, or sodium chloride, has been added.

The device includes an insulating base 15, composed of any material suitable to its purpose, upon which the bottom or base 11 of the container is adapted to be seated. Said insulating base 15 includes a flat upper surface 16 against which the lower surface of said bottom or base 11 is engaged, and the container 10 and insulating base 15 are secured to each other by suitable cement or binding material 17 between said container and insulating base and disposed in surrounding relation to the bottom or base 11 at the outer side of the container 10. That is, the cement or binding material 17 extends continuously over the margin of the flat upper surface 16 and seals an annular surface of the container in surrounding relation to said bottom or base 11 to an annular margin of said flat upper surface 16.

The flat bottom or base 11 of the container 10 is provided with a pair of spaced apart cut-out portions or openings, each denoted 18, which are defined by circular walls extending vertically through said flat bottom or base. Collars, sleeves or short tubular elements, each denoted 19, including a collar, sleeve or short tubular element 19 in each cut-out portion or opening 18, are snugly fitted to the vertical circular walls of said cut-out portions or openings 18 and are disposed in perpendicular relation to the flat bottom or base 11. As shown, the lower ends of the collars, sleeves or short tubular elements 19 terminate flush with the lower surface of the flat bottom or base 11, and the upper ends of said collars, sleeves or short tubular elements terminate at location a trifle, or somewhat, above the upper surface of said flat bottom or base 11, within the lower portion of the interior space or chamber 13. The collars, sleeves or short tubular elements 19 as disclosed are of glass. They could be composed of other insulating material suitable to the purpose. Each collar, sleeve or short tubular element is made rigid with the

container 10 by cementing material 20, such as synthetic rubber, of non-conducting character. More explicitly, the non-conducting cementing material 20, in the instance of each collar, sleeve or short tubular element 19, extends continuously over a circumferential part of a lower portion of the outer surface of the collar, sleeve or short tubular element and secures an annular part of the upper surface of the flat bottom or base 11 in direct surrounding relation to the corresponding collar, sleeve or short tubular element to an annular part of said corresponding collar, sleeve or short tubular element. Additionally, the cementing material or synthetic rubber 20 constitutes or provides a seal between the outer surface of the corresponding collar, sleeve or short tubular element and the bottom or base of the container 10 for precluding the passage of water or liquid from the interior space or chamber 13 between the outer surfaces of the collars, sleeves or short tubular elements and the walls of the cut-away portions or openings 18.

Carbon electrodes, each denoted 21, including a carbon electrode 21 within each collar, sleeve or short tubular element 19 and spaced therefrom, are also disposed in perpendicular relation to the flat bottom or base 11. As shown, the lower ends of the carbon electrodes 21 terminate flush with the lower surface of the flat bottom or base 11, as well as flush with the lower ends of the collars, sleeves or short tubular elements 19, and the upper ends of said carbon electrodes terminate at location considerably above the upper ends of said collars, sleeves or short tubular elements, within the upper or mid-portion of the interior space or chamber 13 provided by the container 10. Each carbon electrode 21 is made rigid with the container 10 by cementing material 22, such as synthetic rubber, of non-conducting character. More explicitly, the non-conducting cementing material 22, in the instance of each carbon electrode, extends continuously about a lower part of the carbon electrode, as well as over a circumferential part of a lower portion of the inner surface of the corresponding collar, sleeve or short tubular element 19, and secures an annular part of said corresponding collar, sleeve or short tubular element to and about said carbon electrode. Additionally, the cementing material or synthetic rubber 22 constitutes or provides a seal between each carbon electrode and the collar, sleeve or short tubular element in surrounding relation to the carbon electrode for precluding the passage of water or liquid from the interior space or chamber 13 between the carbon electrodes and the inner surfaces of said collars, sleeves or short tubular elements 19.

The insulating base 15 includes a flat lower surface 23 adapted to be rested upon a suitable support for the device to maintain the container 10 in upright position, and a cut-away portion 24 of said insulating base is for receiving current conveying members of said device.

Metallic conductors, each denoted 25, including a metallic conductor 25 alined with each carbon electrode 21, are arranged within the cut-away portion 24 of the insulating base 15 and are disposed in perpendicular relation to the flat bottom or base 11 of the container 10. As shown, the lower ends of the metallic conductors 25 terminate at location slightly above the flat lower surface 23 of said insulating base 15, and the upper end portion 26 of each metallic conductor is fitted into and made rigid and secure with

the lower end portion of the carbon electrode with which alined in any suitable and convenient manner.

Said metallic conductor 25 constitute binding posts for lead wires 27, 27 from a source (not shown) of alternating current, and said lead wires are separately secured to said binding posts by binding nuts 28.

The lead wires 27, 27 are for conveying alternating current of any selected frequency, as, for example, alternating current of a commercial frequency such as is commonly provided for homes, offices, etc., to the carbon electrodes 21, 21. The water or liquid 14 will cause a circuit between said carbon electrodes 21 to be closed during practical operation of the device, and said water or liquid is adapted to provide resistance for causing the generation of heat. When water is the liquid employed, common salt, or sodium chloride, ordinarily will be placed in the water to increase its resistance, and thus its capacity to generate heat.

The carbon electrodes 21, 21 desirably will be in such spaced relation to each other, as well as in such spaced relation to the wall of the container 10, as to insure that the whole of the quantity of the water or liquid in the interior space or chamber 13 will be heated to substantially the same temperature.

It will be apparent that heating of the water or liquid will cause evaporation thereof thus to produce moisture in the surrounding atmosphere. Stated otherwise, the current which flows through the water or liquid is adapted to cause boiling which in turn accomplishes humidification of a space or area, as in a house, office, etc., intended to be humidified.

Attention is called to the fact that the collars, sleeves or short tubular elements 19, because extending upwardly from the bottom or base 11 of the container 10, preclude the possibility of evaporation of all of the water or liquid from the interior space or chamber 13. Thus, there can be no deposit of dry sediment upon the interior surface of the container.

The current employed will be insufficient in magnitude to jump the air gap between the carbon electrodes 21, 21 which obviously results when the water or liquid becomes evaporated down to the elevation of the upper ends of the collars, sleeves or short tubular elements 19, so that passage of current between said carbon electrodes will cease with fall of the level of the water or liquid to the elevation of said collars, sleeves or short tubular elements. That is, the device will be inoperative whenever the carbon electrodes are not in water or liquid. Thus, the collars, sleeves or short tubular elements and the manner in which they are arranged in or assembled with the container 10 and its interior space or chamber 13 constitute a safety feature of the device. After set in operation, the device can be forgotten.

The cementing and sealing materials 20 and 22 preclude the possibility of contact of the water or liquid 14 in the interior space or chamber 13 with any metal whatsoever, including the metallic conductors 25, 25. It is well known that brine and hard water attack and destroy ordinary metals of type which could be commercially or practically employed for current conducting purposes in a device of the present nature. Lime and other hard substances in water become precipitated upon ordinary metals quite rapidly, thus to cause the conducting capacity of the

metals to be reduced. Brine and hard water do not attack and destroy carbon electrodes, and lime and other hard substances in water become precipitated upon carbon electrodes quite slowly in really thin layers which readily become flaked off of the carbon electrodes. In short, carbon electrodes will be operative in brine or hard water to efficiently perform their intended function for indefinitely long periods of time.

Desirably, only alternating current, and not direct current, will be applied to the carbon electrodes 21, 21, so that said carbon electrodes will remain intact. Save for the carbon electrodes and their surfaces, all surfaces contacted by the water or liquid to be evaporated are insulative and of such nature as not to become deteriorated by contact with water or liquid, so that the device as a whole will function properly and satisfactorily and efficiently even after indefinitely long usage.

The container 10 supports, desirably fixedly, a cup or tray 29 situated at the outlet or opening 12. More explicitly, said cup or tray 29 is supported concentrically of the outlet or opening 12 in spaced relation to the circumferential wall 30 defining the outlet or opening 12 by a cross member 31 having its opposite end portions secured to the container 10, as at 32, at the opposite sides of said outlet or opening. The cup or tray 29 is for receiving special materials, such as perfumes or medicated substances, to be evaporated thus to cause the surrounding atmosphere to be permeated. Of course, heat of the vapor rising from the water or liquid 14 is adapted to cause the special materials employed to give off fluids or vapors.

In Figs. 3 and 4 there is disclosed a humidifier of modified construction including principles of the invention. Parts in said Figs. 3 and 4 which are similar to parts before described and for the same purpose bear the same reference numerals.

The disclosure of Figs. 3 and 4 is like the disclosure of Figs. 1 and 2, except that the container 10 and the insulating base 15' are detachably secured to each other. The flat bottom or base 11 of said container 10 is seated upon the flat upper surface 13 of said insulating base 15' in the manner as before set forth when the container and insulating base are assembled together.

The metallic conductors 25' are adapted to be removably inserted in spaced apart sockets 33 provided in the upper surface of the insulating base 15' and extending to the cut-away portion 24 of said insulating base. Conducting terminals, each denoted 34, including a conducting terminal 34 for each metallic conductor 25', are suitably and conveniently fixed in said cut-away portion of the insulating base 15' in position to be contacted by the metallic conductors 25' when these are inserted in the sockets 33 as in Fig. 3.

Said conducting terminals 34 suitably and conveniently support lead wires 27, 27 from a source of alternating current. One of the lead wires 27 includes therein a switch 35, adapted to be manually actuated, suitably and conveniently mounted upon the insulating base 15'. The carbon electrodes 21, 21 are adapted to be placed in and out of circuit by operation of the switch 35 to the closed and to the open condition of the lead wire including said switch.

In the instance of each form of the device, the ends of the lead wires 27, 27 which are in remote relation to the insulating base of the device are adapted to be supported upon, or carry,

an ordinary plug for insertion into an ordinary socket, such as a house plug and socket, thus to render said lead wires 27, 27 capable of conveying current for energizing the carbon electrodes 21, 21.

What is claimed is:

1. A device of the character described, comprising a container for liquids, said container having an open upper portion and being cut away at spaced apart lower portions thereof, spaced apart electrodes within said container, a tubular element in each of the cut-away portions of the container, there being a tubular element in surrounding spaced relation to each of said electrodes, means securing each tubular element in its corresponding cut-away portion of said container and providing seals between the container and the tubular elements for precluding the passage of liquid out of said container at the locations between the container and the tubular elements, means securing each electrode in the tubular element surrounding said electrode and providing seals between the tubular elements and the electrodes for precluding the passage of liquid out of said container at the locations between said tubular elements and said electrodes, and conductors secured to said electrodes at the outer side of said container.

2. A device of the character described, comprising a container for liquid, said container having an open upper portion and being cut away at spaced apart locations of its base, spaced apart electrodes within said container, a tubular element snugly fitted to each of the cut-away portions of the base of the container and extending upwardly above said base, there being a tubular element in surrounding spaced relation to each of said electrodes, and the electrodes extending upwardly from the base of the container and terminating in said container at elevation considerably above the upper ends of the tubular elements, means securing the outer surface of each tubular element in its corresponding cut-away portion of said base of the container and providing liquid seals between said container and the outer surfaces of the tubular elements, means securing each electrode to the inner surface of the tubular element surrounding said electrode and providing liquid seals between the inner surfaces of the tubular elements and the electrodes, and conductors secured to said electrodes at the outer side of said container.

3. A device of the character described, comprising a container for liquids, said container having an open upper portion and being cut away at spaced apart lower portions thereof, an insulating base supporting said container, spaced apart electrodes within said container, a tubular element in each of the cut-away portions of the container, there being a tubular element in surrounding spaced relations to each of said electrodes, means securing each tubular element in its corresponding cut-away portion of said container and providing seals between the container and the tubular elements for precluding the passage of liquid out of said container at the locations between the container and the tubular elements, means securing each electrode in the tubular element surrounding the electrode and providing seals between the tubular elements and the electrodes for precluding the passage of liquid out of said container at the locations between said tubular elements and said electrodes, conductors secured to said electrodes and extending

into said insulating base, and lead wires attached to said conductors.

4. A device of the character described, comprising a container for liquids, said container having an open upper portion and being cut away at spaced apart locations of its base, an insulating base supporting said container, spaced apart electrodes within said container, a tubular element snugly fitted to each of the cut-away portions of the base of the container and extending upwardly above said base, there being a tubular element in surrounding spaced relation to each of said electrodes, and the electrodes extending upwardly from the base of the container and terminating in said container at elevation considerably above the upper ends of the tubular elements, means securing the outer surface of each tubular element in its corresponding cut-away portion of said base of the container and providing liquid seals between said container and the outer surfaces of the tubular elements, means securing each electrode to the inner surface of the tubular element surrounding said electrode and providing liquid seals between the inner surfaces of the tubular elements and the electrodes, conductors secured to said electrodes and extending into said insulating base, and lead wires attached to said conductors.

5. A device of the character described, comprising a glass container for liquids, said container having an open upper portion and being cut away at spaced apart locations of its base, spaced apart carbon electrodes within said container, a glass tubular element fitted to each of the cut-away portions of the base of the container and extending upwardly above said base, there being a tubular element in surrounding spaced relation to each of said carbon electrodes, and the carbon electrodes extending upwardly from the base of the container and terminating in said container at elevation considerably above the upper ends of the tubular elements, non-conducting cementing material securing the outer surface of each tubular element in its corresponding cut-away portion of said base of the container and providing liquid seals between said container and the outer surfaces of the tubular elements, means securing each carbon electrode to the inner surface of the tubular element surrounding said carbon electrode and providing liquid seals between said inner surfaces of the tubular elements and the carbon electrodes, and conductors secured to said carbon electrodes at the outer side of said container.

6. In a device of the character described, a container of insulating material having an opening in a lower portion thereof, a tubular element of insulating material around said opening and extending upwardly in said container, an electrode within said container and tubular element, means supporting said electrode upon said container, means securing said tubular element to said container, and a conductor fitted to said electrode and extending outwardly of said container.

7. In a device of the character described, a container having an opening in a lower portion thereof, a tubular element of insulating material extending upwardly within said container and separating said opening from portions of the container surrounding said tubular element, an electrode within said container and tubular element, and means supporting said electrode within said tubular element and upon said container.

8. The combination as specified in claim 7, and means sealing said opening closed at location adjacent said electrode.

9. In a device of the character described, a container having an opening in a lower portion thereof, a tubular element of insulating material extending upwardly within said container and separating a lower part of the interior of the container surrounding said tubular element from said opening, an electrode within said tubular element and spaced therefrom and extending to position in the container above the tubular element, and means supporting said electrode within said tubular element and upon the lower portion of said container.

10. The combination as specified in claim 9, and means sealing said opening closed at location within said tubular element and adjacent said electrode.

11. A device of the character described, comprising a container for liquids having spaced apart openings in a lower portion thereof, spaced apart tubular elements of insulating material extending upwardly within said container, each of said tubular elements separating a lower part of the interior of the container surrounding the tubular element from one of said openings, an electrode within each of said tubular elements, said electrodes extending to position in the container above the tubular elements, and means supporting said electrodes within said tubular elements and sealing said openings closed.

12. In a device of the character described, a container of insulating material having an opening in a lower portion thereof, a tubular element of insulating material extending upwardly in said container from said lower portion separating said opening from the interior of the container save by a passage through said tubular element, an electrode within said container and tubular element, said electrode being spaced from the tubular element and extending to position within the container above said tubular element, and means supporting said electrode within said tubular element and upon said container.

13. A device of the character described, comprising a container for liquids having spaced apart openings in a lower portion thereof, spaced apart tubular elements of insulating material extending upwardly in said container from said lower portions separating said openings from the interior of said container save by passage through said tubular elements, an electrode within each of said tubular elements in spaced relation thereto and extending to position in the container above the tubular elements, and means supporting said electrodes within said tubular elements and upon said container.

14. A device of the character described, comprising a container for liquids having spaced apart openings in a lower portion thereof, spaced apart tubular elements of insulating material extending upwardly in said container from said lower portions separating said openings from the interior of the container save by way of end portions of said tubular elements substantially spaced from said lower portions of the container, an electrode within each of said tubular elements and extending to position within said container above the tubular elements, and means supporting said electrodes within said tubular elements and upon said container.

DONALD R. STAPLETON.